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**ABSTRACT**

5 A process for fabrication of a semiconductor device including a modified ONO structure, comprising forming the modified ONO structure by providing a semiconductor substrate; forming a first oxide layer on the semiconductor substrate; depositing a layer comprising a high-K dielectric material on the first oxide layer; and forming a top oxide layer on the layer comprising a high-K dielectric material. The semiconductor device may be, e.g., a MIRRORBIT™ two-bit EEPROM device or a floating gate flash device including a modified ONO structure.